

Quality Improvement in Pediatric Endoscopy: A Clinical Report From the NASPGHAN Endoscopy Committee

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ABSTRACT

The current era of healthcare reform emphasizes the provision of effective, safe, equitable, high-quality, and cost-effective care. Within the realm of gastrointestinal endoscopy in adults, renewed efforts are in place to accurately define and measure quality indicators across the spectrum of endoscopic care. In pediatrics, however, this movement has been less-defined and lacks much of the evidence-base that supports these initiatives in adult care. A need, therefore, exists to help define quality metrics tailored to pediatric practice and provide a toolbox for the development of robust quality improvement (QI) programs within pediatric endoscopy units. Use of uniform standards of quality reporting across centers will ensure that data can be compared and compiled on an international level to help guide QI initiatives and inform patients and their caregivers of the true risks and benefits of endoscopy. This report is intended to provide pediatric gastroenterologists with a framework for the development and implementation of endoscopy QI programs within their own centers, based on available evidence and expert opinion from the members of the NASPGHAN Endoscopy Committee. This clinical report will require expansion as further research pertaining to endoscopic quality in pediatrics is published.

Key Words: clinical competence, endoscopy, endoscopy, endoscopy, gastrointestinal/education, gastrointestinal/standards, pediatric, quality

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The importance of measuring the quality of healthcare and using the outcome data to promote improvement in care delivery is now widely endorsed (1). With regard to gastrointestinal endoscopy, introduction of colorectal cancer screening programs has fostered the development of evidenced-based indicators and auditable outcomes that can be measured for adult colonoscopy quality assurance (2,3). Stemming from this, during the last decade,

widespread efforts exist to identify, define, and measure clinically relevant quality and safety indicators for adult endoscopy broadly in an effort to improve the quality and efficiency of patient-centered care (4–7). With regard to pediatric endoscopy, however, this movement has been less well-defined.

Pediatric endoscopy should not be an exception to the trend toward quality improvement (QI) and patient-centered medicine (8). Given the unique nature of pediatric practice, quality and safety indicators derived from adult practice are not always directly applicable to the specific needs of pediatric patients and their families (8,9). Therefore, a clear need exists to define and monitor evidence-based indicators of high-quality pediatric endoscopy. In the future, a systematic approach to quality assurance and QI in pediatric endoscopy will be essential.

A high-quality endoscopy has been defined as “an examination in which patients receive an indicated procedure, correct and relevant diagnoses are recognized or excluded, any therapy provided is appropriate, and all steps that minimize risk have been taken (6).” Quality endoscopy care is multifaceted and is not only based on technical proficiency but also encompasses elements related to clinical quality and the overall patient experience broadly, including timeliness, equity, appropriateness, and comfort (5,7,10). Maintaining and enhancing the quality of pediatric endoscopy services requires a continuous process-based approach that defines and measures indicators of pediatric endoscopic quality, implements changes based on measures, and analyzes the effects of these changes to help define new quality performance standards (Fig. 1).

The first step in quality assurance is to identify and define reliable and appropriate quality indicators to be measured. Although some evidenced-based indicators for adult endoscopy may be directly applicable to pediatrics, there are a number of endoscopic practice issues that differ between children and adults (9) that highlight the need for the development and validation of pediatric-specific quality and safety indicators. To achieve this goal, it will be important for the pediatric endoscopy community to strive to identify elements of high-quality pediatric endoscopic care. In addition, further study is necessary to define the clinical relevance and importance of potential indicators for pediatric endoscopy and to measure performance variability within pediatric endoscopic practice with regard to these indicators.

A second key element to any QI program is the availability of reliable outcome data on current performance, which is essential to allow one to compare the performance of an individual or a group of individuals with an ideal or benchmark to improve performance (11). Standardized electronic endoscopy reporting systems are important because they permit reliable, accurate data collection to support targeted QI programs, which require repeated cycles of measurement, intervention, and evaluation (5). The pediatric endoscopy community should ultimately strive to support the development of central data repositories to facilitate widespread benchmarking, identification of performance gaps and continuous QI efforts based on pediatric-specific indicators in an effort to

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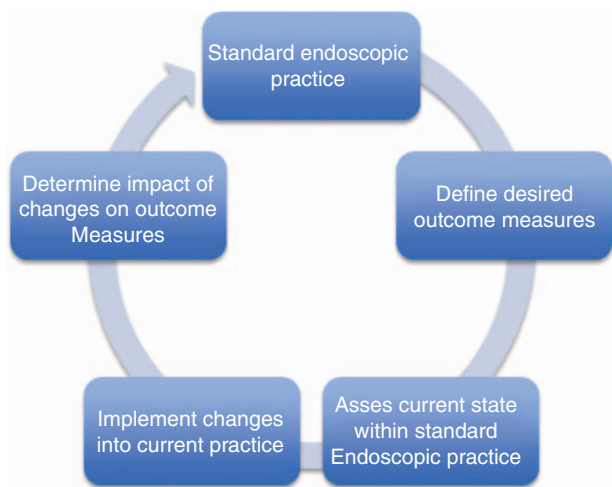


FIGURE 1. Continuous cycle of process improvement in endoscopy practice.

deliver higher-quality pediatric endoscopic care to patients and their families. The Committee intends to provide pediatric endoscopists with a framework they can use to develop and implement an endoscopy QI program and includes a discussion of potentially relevant quality and safety indicators and corresponding measures. This report, which seeks to prioritize key measures, is based on available evidence and expert opinion from members of the Endoscopy Committee and will require longitudinal revision and expansion as further research pertaining to endoscopic quality in pediatrics is published. It should be clearly acknowledged that development of a quality dashboard for gastrointestinal endoscopy that includes all of the metrics discussed would be onerous and require excessive resources. It is therefore advisable to view these as a “menu” and carefully determine which items are most applicable and measureable within a given endoscopy unit. As the necessity for quality and safety improvement initiatives permeates health care, there will hopefully be added capacity to expand these programs and include additional metrics.

METHODS

The individual quality components presented in this manuscript were chosen and developed as a result of a consensus

conference within the Endoscopy Committee of NASPGHAN. After creation of an outline of the quality measures deemed to be most relevant and measurable within the realm of pediatric endoscopy, the primary authors performed PubMed literature searches on these topics to review the pertinent published literature, which has been referenced throughout this manuscript.

For the purposes of this manuscript, quality and safety indicators have been broken down into 3 phases of care: preprocedure, intraprocedure, and postprocedure. In deference to the landmark 2001 reference “Crossing the Quality Chasm” by the Institute of Medicine (12), quality initiatives can be categorized into ≥1 core principles that define high-quality care. These include safe, timely, effective, efficient (economical), equitable, and patient-centered. In an ideal QI program, metrics or initiatives in each of these arenas should be included (Table 1).

PREPROCEDURE

From the moment the decision is made to proceed with an endoscopic procedure in a child, the patient’s experience begins. For the purposes of this discussion, the preprocedure period may be defined as all contact between members of the endoscopy team with the patient and their caregivers before administration of sedation or insertion of the endoscope (6). Important, assessable factors for all endoscopic procedures during this period include patient education, informed consent, bowel preparation, and timeliness of the procedure.

Patient Education and Informed Consent

First and foremost is appropriate patient education of the procedure itself. Education should include a thorough discussion of the indications for the procedure (both in general and specifically for the patient), a description of exactly what occurs during the procedure, a review of the risks and benefits of the procedure (with center-specific data, if available), and an explanation of what to expect following the procedure. In addition to ensuring that the family has a proper understanding of what is to be done, how it is to be done, and the risks involved in doing it, the potential benefits and alternatives to the procedure must be discussed. Review of common postprocedure signs and symptoms, especially those that should prompt additional concern and the need to notify medical personnel, is particularly important. Education should be provided with appropriate time allocated for patient and caregivers to ask questions and

TABLE 1. Categories of QI initiatives in pediatric endoscopy and potential metrics

		Example quality initiatives and metrics for pediatric endoscopy						
		Category						
Phase of care	Quality initiative	Safe	Timely	Effective	Efficient	Equitable	Patient-centered	Potential metrics
Preprocedure	Patient education			X	X		X	Survey, post-test
	Informed consent	X					X	Survey
	Wait-time	X	X	X		X	X	Direct measure, survey
	Bowel preparation			X	X		X	EMR report, audits
Intraprocedure	Time-out	X		X				Audits
	Debriefing	X						Audits
	Ileal intubation	X		X				EMR report, Audits
Postprocedure	Adverse events	X		X		X		EMR, manual tracking
	Satisfaction		X			X	X	Postprocedure calls
	Pathology results					X		Time to notification, failure rate

EMR = electronic medical record; QI = quality improvement.

the provider to assess comprehension. Additionally, it should be delivered at a suitable educational level for both patients and their caregivers. This educational process may use ≥ 1 formats to provide the most effective and efficient experience and may include discussions in person or over the phone, print materials, web-based content, DVDs, and/or videos. A number of excellent resources exist for this purpose, including material from NASPGHAN on the GIKids.org website, which are in both English and Spanish (reference: <http://www.naspghan.org/> and <http://www.gikids.org>).

Several studies validate the improved efficacy of multimedia educational materials over face-to-face discussions in improving comprehension, preprocedure anxiety, and patient satisfaction (13–15). This education should take place before the day of the procedure, whenever possible, so a truly informed consent can be given without the “implied consent” of already being present at the procedure site, with teams mobilized and cleanouts performed. Studies have documented that patient and caregiver retention of informed consent is poor. This highlights the importance of a face-to-face interaction between providers and the family, wherein direct assessment of patient and caregiver understanding can be performed and comprehension verified before the procedure. Ultimately, it is the responsibility of the performing endoscopist to ensure that comprehensive informed consent has been obtained before beginning the endoscopy, even if this process was completed by another provider before the date of the procedure.

From a QI standpoint, an ideal program should provide confirmation of patient education and informed consent and include an assessment metric regarding adequacy. This metric may take the form of either a survey, which asks families to rate the quality of the educational and informed consent process (Fig. 2), or a “post-test” administered to families to objectively

assess their knowledge of the upcoming procedure. The second option is clearly more onerous and would vary significantly for advanced and interventional procedures. In general, efforts in the realm of optimizing the informed consent process fall within the *patient-centered care* category of quality, but may also be considered within the category of *safety*. This is because of the potential effect on setting appropriate expectations and anticipatory guidance.

Wait Time

The time between the decision to perform an endoscopic procedure and the actual procedure is an important quality metric often overlooked. This metric crosses several quality categories, including *timeliness of care*, *patient-centered care*, *safety*, and, potentially, *effectiveness* of care. For standard diagnostic endoscopic procedures for chronic gastrointestinal complaints in children, safety standards for wait time are not yet established. An adult study from Canada has attempted to establish guidelines for appropriate wait times by indication, ranging from 2 weeks to 2 months (16). Although endoscopy in children is often elective, from a patient-centered care standpoint, moving expeditiously toward endoscopy once the decision has been made to do so is a significant determinant of patient satisfaction (16). Obviously, specific patient indications (ie, gastrointestinal bleeding, biliary obstruction, foreign body ingestion (17)) for the timeliness of endoscopy are very much *safety* and *efficacy* issues. Regardless of the category, this quality measure may well be considered a staple of a comprehensive QI program in pediatric endoscopy.

Wait time, as a quality metric, can help inform providers and administrators of potential roadblocks to timely provision of care within their system. Direct quantitative measurement of wait time can be performed in various ways. Ideally, reporting through the electronic medical record (EMR) could be performed to provide monthly or quarterly data, establish a baseline, and develop a control chart (similar to Fig. 3 for adverse events). Subsequently, deviations outside the parameters of the control chart can be recognized and a root cause analysis can be performed if necessary. Because wait times are influenced by factors external to the system itself (eg, school calendars, caregiver work schedules, and socioeconomic factors of families), qualitative assessment can be a helpful adjunct, for example, to help delineate what caregivers perceive to be an appropriate wait time.

In an effort to improve the quality of the care that we provide our patients, please answer the following questions in regards to your child’s recent endoscopy experience at our center.

1. In general, I found the education and guidance that we received regarding what procedure was to be performed and why it was needed for my child was:
 - a) Not performed
 - b) Poor
 - c) Fair
 - d) Good
 - e) Very good
2. I feel the quality of the consent process, where the risks, benefits and alternatives to performing this procedure were explained to me was:
 - a) Not performed
 - b) Poor
 - c) Fair
 - d) Good
 - e) Very good
3. The amount of time we needed to wait between the decision to perform the endoscopy and the day it could actually be performed:
 - a) Was much longer than expected
 - b) Was somewhat longer than expected
 - c) Was about what I expected
 - d) Was somewhat shorter than expected
 - e) Was much shorter than expected
4. Your overall experience in the scheduling, preparation and performance of this endoscopic procedure at this center is best described as:
 - a) Very poor
 - b) Poor
 - c) Fair
 - d) Good
 - e) Very good

Please provide any comments you feel can help us in the future to provide better quality of care.

FIGURE 2. Sample postendoscopy quality survey.

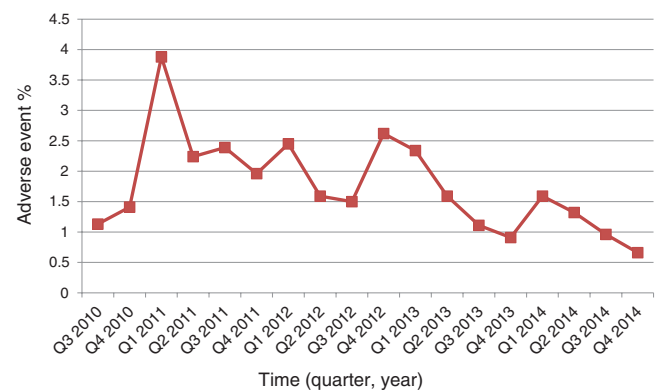


FIGURE 3. Sample control chart illustrating quarterly rate of postendoscopy adverse events requiring unanticipated medical evaluation.

Bowel Preparation

This quality measure has been well-studied in adults, with clear implications for other standard quality measures, such as cecal intubation time and adenoma detection rates (18–20). In this fashion, bowel preparation assessment can definitely be considered within the realm of *efficacy* and *safety* because poor visualization may lead to higher rates of adverse events (21,22). On the contrary, considering that inadequate bowel preparation can be directly linked to additional costs of rescheduling or repeating colonoscopy, this metric also affects *efficiency* and *patient-centered care*. A recent clinical report from the NASPGHAN Endoscopy Committee (23) reviewed relevant pediatric trials of various cleanout regimens and general principles and practices for colon cleanout. In adult practice, several validated, standardized bowel preparation scales assess the adequacy of colonic cleanout (24), including the Ottawa scale (25), the Boston Scale (26), the Aronchick (27), and the Chicago scale (28). No analogous scale, however, has been validated in children undergoing endoscopy. Therefore, outcome measures in the pediatric literature have used a variety of subjective endpoints to define a successful cleanout (29,30). This gap needs to be addressed with additional research, which would be facilitated by inclusion of colon preparation as a standard quality measure across programs. Programs that intend to include bowel cleanout as a QI metric will need to determine an appropriate scale to meet their clinical and data collection needs. Regardless of the scoring system used, bowel preparation quality should be documented in a standardized manner for every colonoscopy. To facilitate the most comprehensive assessment within the program, the scale would ideally be included within the colonoscopy report of the EMR to permit the generation of automated reports at regular intervals. This methodology may be cost-prohibitive or impractical for some programs without a formalized EMR system for their endoscopy reports. In these centers, manual audits of random colonoscopy reports would suffice to provide an ongoing analysis of the cleanout efficacy.

INTRAPROCEDURE

The intraprocedure period extends from the administration of sedation, or insertion of the endoscope when no sedation is given, until the endoscope is removed (6). This period includes all technical aspects of the procedure, including completion of the examination and of therapeutic maneuvers. Common to most endoscopic procedures is the provision of sedation and need for patient monitoring.

Time-out

The advent of preflight checklists in aviation has been often cited as one of the critical landmarks in the improvement of quality and safety within the industry (31). Use of a time-out strategy has been brought to the healthcare industry in recognition of the wide discrepancy between error rates in medicine versus aviation. This practice has become standard within the field of surgery (32) and, more recently, within endoscopy (33). Most centers now have a protocol for the preprocedure time-out, primarily focused on the surgical patient. Some of the elements of these time-out checklists may not be applicable to the patient undergoing endoscopy, such as the laterality of the intended procedure. Nevertheless, critical elements that are applicable in endoscopy include:

- (1) Verification of the proper patient using at least 2 identifiers
- (2) Declaration of the endoscope(s) being used for the procedure

- (3) Confirmation of the intended procedure to be performed with assurance that it matches what is listed on the signed consent form
- (4) Position of the patient (eg, supine or left lateral)
- (5) Review of any anticipated need for antibiotics, blood products, and/or implants
- (6) Assessment that all necessary personnel and equipment are present within the room
- (7) Agreement on the patient's weight and any known allergies
- (8) The anticipated disposition and plan of care for the patient following completion of the procedure (eg, postanesthesia care unit then discharge to home)

Additional elements that may be applicable for the pediatric endoscopy patient include:

- (1) Verification that the correct patient information is entered into the videoprocessor system and matches the identification on the patient and the medical chart
- (2) Assessment of the anticipated fire risk in the patient undergoing anesthesia, taking into account the use of a concentrated oxygen source and any anticipated use of electrocautery
- (3) Review of any special biopsies or unusual aspects of the procedure that the team should be aware of

The final element of a complete time-out is the open invitation for caregivers in the room to voice any questions or concerns that may affect the case. From the safety standpoint, these elements should be reviewed methodically before each case, using a printed or posted checklist to ensure each element is addressed. From the quality standpoint, recording compliance with performing time-outs is another potential metric to be included in the endoscopy quality dashboard (Table 2). This may be measured via automated reports within the EMR if nursing is required to document completion or via random audits. Once again, control charts demonstrating baseline data can be used to set compliance goals or determine whether the process is failing. This metric would primarily be categorized under *safety*, but also includes elements of *efficiency* by streamlining endoscopic procedures through improved communication.

Ileal Intubation Rates

Several quality metrics are used in adult endoscopy center around determinants of a technically successful endoscopic procedure, typically related to the accurate completion of the diagnostic purpose of the endoscopy. As that purpose in many endoscopies in adults is centered on screening for malignancy, the most common metrics used are adenoma detection rates for colonoscopy and Barrett esophagus detection rates for esophago-gastroduodenoscopy (EGD). In pediatrics, these measures are obviously irrelevant. In general, adult gastroenterologists measure cecal intubation rates as a measure of completeness for screening colonoscopy. In pediatrics, because a large portion of the colonoscopies performed are for inflammatory bowel disease screening rather than malignant polyps, ileal intubation rate makes more sense as a general quality measure. Obviously, circumstances in specific cases make complete colonoscopy and ileal intubation neither intended nor advisable, but the general intention for the vast majority of pediatric colonoscopies should include an evaluation (and biopsy) of the terminal ileum (9). This quality metric is important to track because it is affected by several other quality factors, including the quality of the bowel preparation, the skill level of the endoscopist, and the adequacy of the anesthesia or sedation.

TABLE 2. Sample pediatric endoscopy quality improvement dashboard

Phase of care	Quality initiative	Metric/method	Baseline	End-of-year goal	Qtr 1	Qtr 2	Qtr 3	Qtr 4	YTD
Pre procedure	Patient education	Survey, % excellent							
	Informed consent	Survey, % excellent							
	Wait time	Audit, days to procedure							
	Bowel preparation	Provider report, % excellent							
Intraprocedure	Time-out	Audit, % performed							
	Ileal intubation	EMR query							
	Debriefing	Audit, % performed							
Postprocedure	Adverse event rate	Rate \geq grade 2							
	Patient/caregiver satisfaction	Survey, % excellent							
	Communication of results	Audit/EMR query, days to communication							

EMR = electronic medical record; YTD = year to date.

The Committee would suggest an initial goal of 90% as a general metric. A recent study of pediatric, however, colonoscopy indicates that many practitioners are not meeting this mark, as the ileal intubation rate for pediatric endoscopists from 14 centers was found to be 84% in procedures with intention to intubate the ileum (29). To facilitate tracking of this measure, the proximal extent of all colonoscopies should be included in the procedure note. These data may then be compiled through electronic reporting from the EMR or manual chart review. Alternatively, review of pathology reports from colonoscopies may be reviewed to determine the presence or absence of an ileal biopsy. Time to achieve ileal intubation is another potential metric, particularly relevant for assessment of trainees. In addition, withdrawal time is another quality metric commonly used by adult gastroenterologists, as an indication of the thoroughness of the examination. These metrics are categorized under the provision of *effective care*, helping to ensure that a complete diagnostic study has been performed.

Debriefing

Similar to the need for a preprocedure timeout, a complete debriefing should follow endoscopic procedures. The critical elements of a successful debriefing include:

- (1) Formal verification of the procedure of record to be entered into the medical record.
- (2) Summary of pertinent findings from the endoscopic procedure performed
- (3) Review of the anatomic location and identification number of all histological or other specimens collected, and any special processing requirements
- (4) Declaration of any known adverse events and implications on the recovery care plan defined during the time-out

As with tracking of the time-out strategy, measurement of compliance with the debriefing procedure can be used as a metric for the quality dashboard within the endoscopy program. This may be tracked via electronic reporting or via manual chart review. This metric primarily resides within the *safety* category.

POSTPROCEDURE

The postprocedure period extends from the time the endoscope is removed from the patient to subsequent follow-up (6). Postprocedure activities include recognition and documentation of

adverse events, assessing patient satisfaction, and pathology communication follow-up.

Adverse Events

Complete and accurate tracking of endoscopic-related adverse events is arguably the most critical measure within an endoscopy unit's quality dashboard.

Determination of an institution-specific adverse event rate affects almost all of the quality categories. First and foremost, it affects the *safety* of the provided care by informing endoscopists whether and when adverse event rates are increasing or significantly differ from established benchmarks. Though national benchmarks have not been well-established, standardization of this practice using accepted definitions will help usher in a new era of quality and transparency around endoscopic safety. A classification system to stratify and categorize adverse events in pediatric endoscopy has been recently proposed (34). *Timeliness* of care may also be addressed through tracking of adverse events. To date, most published studies of pediatric endoscopy adverse events examine intraprocedural events. Most adverse events, however, occur in the 3 to 5 days following endoscopy (34). With careful monitoring, delay of care can be avoided. Through early identification of potential adverse events with a robust tracking method, the *effectiveness* of managing these patients is improved. Furthermore, by reviewing the patterns of events encountered and the costs of unintended medical evaluation resulting from them, opportunities are created to improve the efficiency of the care provided. Finally, by providing transparent data on the site-specific rate of adverse events and focusing on ensuring that the patient has undergone a safe procedure, truly *patient-centered* care has been provided.

Perhaps the only quality category that may not be affected by a dedicated adverse event tracking program is that of *equitable* care. With well-established program, however, data could be more deeply analyzed to determine whether any discrepancies in adverse event rates exist between groups of patients (ie, by race, sex, socioeconomic class, and insurer/payer).

Satisfaction

As an overall metric of the quality of *patient-centered* care that is provided during a patient's endoscopy experience, assessment of the patient and caregiver's satisfaction with the procedure is an important variable. Whether by standardized phone call, email,

or paper-based mail survey, asking families to rate their experience on a standard Likert scale and tracking the percentage of patients who rate their care as excellent provides ongoing feedback to the unit and may provide an early indication of developing problems (Fig. 2). Once again, subanalysis of these data by patient demographics can indicate whether the care given is *equitable* across all patient populations.

Communication of Biopsy Results

Recent data illustrate poor correlation between gross endoscopic appearance and results of pathology findings of endoscopic biopsies in EGD in children (35). This makes pathology findings all the more critical in the interpretation of endoscopy in children. Endoscopy is an invasive, expensive, and potentially risky procedure, so timely communication of these biopsy results to the patients and families who bear these risks and costs cannot be overemphasized. In the oft-cited address “Escape Fire” at the 1999 Institute for Healthcare Improvement National Forum, Don Berwick states, “Information, we now see, is care. People want knowledge, and the transfer of knowledge is caring, itself (36).” To date, no accepted benchmark exists for an appropriate interval between the completion of an endoscopic procedure and the communication of results. Tracking of communication times and subsequent process mapping to remove barriers and decrease times are desirable components of a pediatric endoscopy QI dashboard. This is also an area where determination of communication times across patient populations, including non-English-speaking families, may be an appropriate assessment of provision of *equitable* care.

Additionally, this metric is a good measure of *timeliness* and *patient-centered* care. Establishing a standard cutoff time, beyond which communication of results would be considered a “failure,” may also be valuable. In the Committee’s opinion, 2 weeks is a reasonable upper limit for communication of results. Tracking communication time frame and implementing safeguards to decrease or eliminate unnecessary delays are worthy quality endeavors. Ongoing collection of these data is challenging and will likely require development of standardized EMR queries or manual chart-audits, which require additional costs and/or resources.

OPERATIONAL EFFICIENCY

In an era of value-based care and with increasing market economy forces imposed on endoscopy units, it becomes prudent to discuss ways to monitor and optimize operational processes. The work flow involved in the care of pediatric patients varies enough from adult care, which again limits the ability to use available adult quality metrics for turn-over time and procedural volumes. Factors that influence endoscopy unit efficiency include the capacity of each endoscopy room, scheduling process, no-show rates, and cancellation rates. Data are lacking to guide these processes in pediatrics. One survey investigated the average turn-over and procedural time allocation at 18 pediatric endoscopy centers (37). The majority of centers reported turn-over time of 16 to 20 minutes with only 1 center regularly exceeding 30 minutes. On average, most centers allocated 45 minutes for an EGD, 58 minutes for a colonoscopy, and 76 minutes for a combined EGD/colonoscopy case including turn-over time. In terms of actual procedure time, another large multicenter pediatric study of 14 sites, encompassing >21,000 colonoscopies, found a mean procedure duration of 31.7 minutes, with longer duration associated with increasing age of the patient, use of general anesthesia, poor cleanout, and presence of a fellow (29). This type of multicenter data is extremely helpful for benchmarking purposes when tracking individual institutional data and developing endoscopy quality programs. Monitoring

TABLE 3. Interventions to improve efficiency

Target area for improvement	Intervention
Personnel not available at time of procedure	Arrival time monitoring and reporting of outcomes Block scheduling Documentation/consent ready in advance Consequences for late arrivals (loss of early morning case time)
Late patient arrivals	24-h Advance reminder phone calls Capacity to shift patients around (some overlap)
High no-show rate	Reminder phone calls Social worker involvement to address barriers
Prolonged turn over time	2 Rooms per endoscopist Staff incentives for efficiency Recognition programs Ongoing evaluations of bottleneck
Long wait list	Standardize process to release unused time Expanding number of operational rooms
Large number of add-on cases	Block time for urgent cases Dedicated operating room endoscopy time

systems variables as part of the quality dashboard can help identify potential areas for intervention. Table 3 summarizes the most common process issues encountered in the endoscopy suite and potential QI initiatives to address them.

SUMMARY

The quality metrics outlined here are intended to serve as a starting point for a conversation regarding what we, as pediatric gastroenterologists, may determine to be the most appropriate quality indicators in the delivery of endoscopic care to our patients. As time and technology progress, additional measures will be established. In the era of “pay-for-performance” and population health, measurement of a center’s diagnostic yield (proportion of abnormal versus normal studies) may become a primary metric of appropriate patient selection.

Currently, limited data are available to suggest accepted thresholds for pediatric endoscopy quality metrics. To truly establish these thresholds, a critical mass of pediatric endoscopy centers needs similar tracking measures, using standardized definitions and shared data. This would serve to further delineate key evidence-based pediatric-specific quality indicators, validate them in a prospective fashion to measure their performance as predictors of clinically relevant outcomes and high-quality, patient-centered care, and help to establish evidence-based benchmarks for each indicator. This Endoscopy Committee clinical report is intended to serve as a starting point.

Although the process of implementing a QI program in a pediatric endoscopy program may seem daunting, the importance of this endeavor to assure delivery of high-quality care cannot be overemphasized. The first step down this path is a commitment to the process and careful consideration and inclusion of the key stakeholders within the institution. The list of potential quality measures outlined in this manuscript may serve as a guide but should not be considered either an exhaustive reference or minimal requirement. The development of a QI program itself should be considered a cycle of continuous process improvement that can and should be expanded and refined over time. Attention to this process

and engagement of the various stakeholders will have the added benefit of developing a culture of safety and improvement within each institution.

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